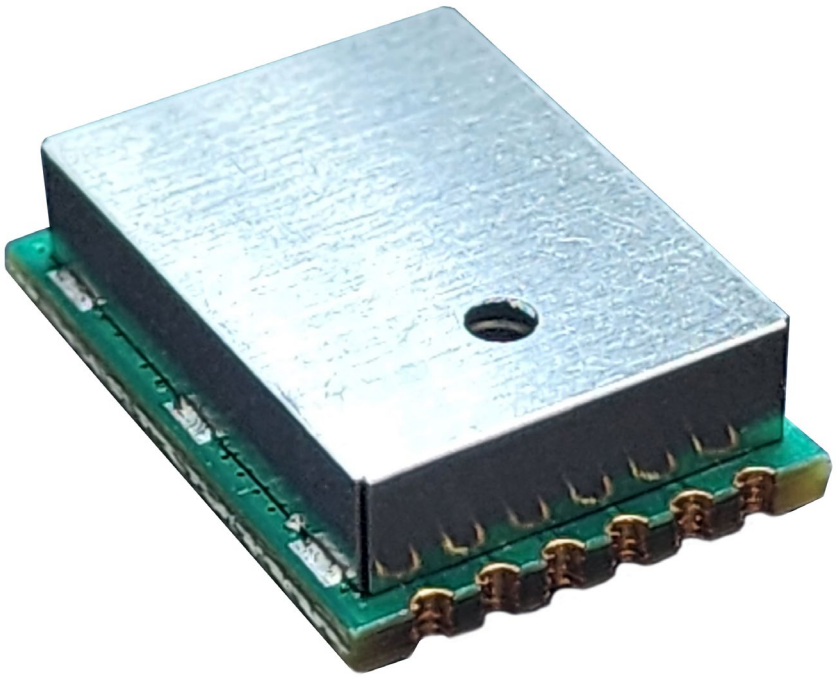
PRODUCT SPECIFICATION

SMART BPS GEN2 TEM000007

BATTERY PACK PRESSURE SENSOR FOR THERMAL RUNAWAY DETECTION



DRAWN	ENGINEER	APPROVAL	ECN #	DATE
	Johnson Wang	John Du	ECN000014	15-Jul-2022

SHEET	TITLE	DRAWING NUMBER	REV
1 OF 7	PRODUCT SPECIFICATION	TEM000007-PSP	1

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REVISION LOG

Revision	Date	Changes
1	18-Dec-2021	Tem version Initial Release
2	15-Jun-2022	Add dimension information, update 3D model pictures
3	1-Jul-2022	Update 3D model and PIN definition
4	2-Jul-2022	Update PIN definition
5	8-Jul-2022	Change the picture, add UART port, and some parameters update
6	8-Jul-2022	Change to add customer name
7	15-Jul-2022	Release generic one
8	31-Jan-2023	Modify the I2C baud-rate to max250kbps

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1 GENERAL DATA

1.1 DESCRIPTION

In this specification a SMART sensor is described that has the objective to measure absolute pressure in the battery pack of electric vehicle. It provides multi-operation modes to meet current consumption requirements. Also, it integrates Microcontroller to provide smart function for early warning in low power mode once there's thermal risk occurred during packing.

1.2 KEY FEATURES

- Small Package (15 X 20 X 5.5mm)
- Easily Installed
- Low Power Consumption
- High Pressure Accuracy
- UART/ IIC / SPI Output Selectable
- Compatible with 3.3V / 5V System
- Smart Pressure Monitor at Running and Parking Mode
- Automotive Qualified

2 CHARACTERISTICS

2.1 ABSOLUTE MAXIMUM RATINGS

Stresses exceeding these listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

Item	Description	Rating	Unit
1	Supply voltage	-0.3 ~ 6	V
2	Voltage at all signal pins	-0.3 ~ VDD + 0.3	V
3	Current at all I/O pins	± 10	mA
4	Operation Temperature	-40 ~ 105	℃
5	Storage Temperature	-40 ~ 125	℃
6	Maximum Withstand Ambient Pressure	600	KPa
7	Output Sink / Source Current per I/O	± 10	mA

8	ESD		
8.1	HBM	± 2	KV
8.2	CDM	± 500	V

2.2 RECOMMENDED OPERATING CONDITIONS

Item	Description	Rating
1	Functional Safety	QM
2	Operation Voltage Range (V)	3 ~ 5.5
3	Current Consumption @ High Power Mode (mA)	≤ 7
4	Current Consumption @ Low Power Mode (mA)	≤ 0.07 *
5	Current Consumption @ Deep Sleep Mode (uA)	≤ 1
6	Output Type	IIC / SPI / UART
7	Communication Speed	
7.1	IIC (KHz)	1 ~ 250
7.2	SPI(KHz)	1 ~ 400
7.3	UART (bps)	9600 ~ 115200
8	Output Pressure Range (KPa) (Can be customized)	50 ~ 165 (TBD)
9	Pressure Accuracy (KPa) @ Full Temperature	± 2
10	Input Level	
10.1	High Level (V)	≥ 0.7 * VDD
10.2	Low Level (V)	≤ 0.3 * VDD
11	Output Level	
11.1	High Level (V)	≥ 0.8 * VDD
11.2	Low Level (V)	≤ 0.2 * VDD
12	Power-On Reset	
12.1	POR Threshold Voltage on VDD Falling (V)	0.8 ~ 1.6
12.2	POR Threshold Voltage on VDD Rising (V)	1.4 ~ 1.8
13	Power-up Time (mS)	≤ 30
14	Step Response Time (mS)	≤ 10
15	Over Voltage Protection	Selectable
16	Reverse Polarity Protection	Selectable
17	Short Circuit Protection	No

* Average current @ 25C without external load.

2.3 STATE MACHINE

BPS product state machine is as below, there're four operations modes defined in below block. Deep sleep mode is selectable.

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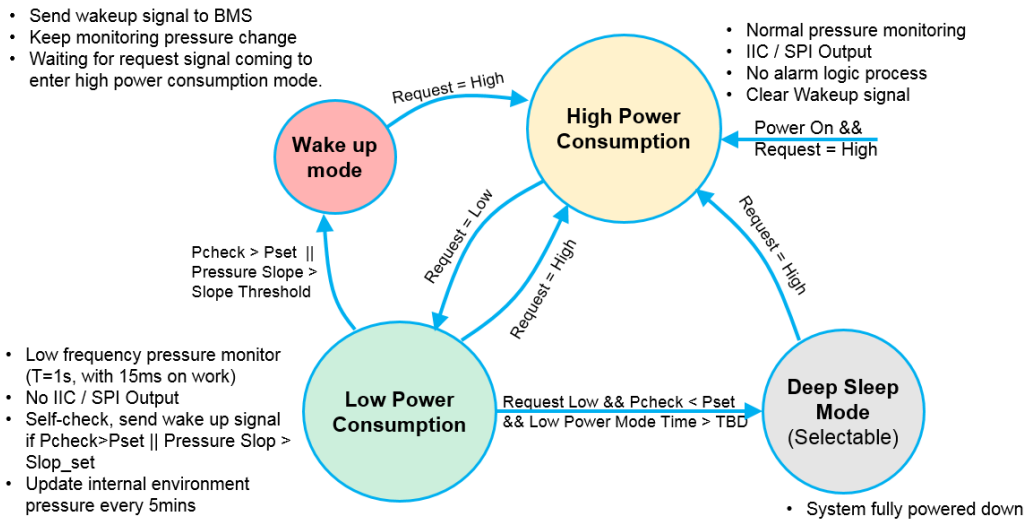
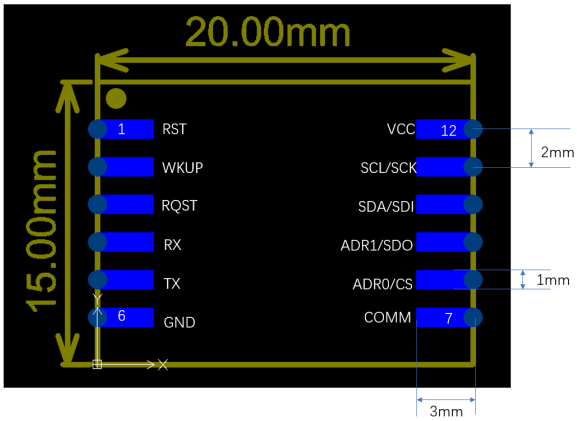


2.4 PIN DIFINITION

BPS PIN definition, key dimensions are as below.



Pin	Pin Name	Description
1	RST	Reset signal. Suggest floating or pull-up if not using.
2	WKUP	Wake up signal, BPS sends WKUP signal to wake up BMS when abnormal pressure is detected. High level is active. External pull-down resistor is recommended.
3	RQST	Request signal, BMS sends RQST signal to enable BPS working modes. External pull-down resistor is recommended. 1.High level enables high power consumption working mode. 2.Low level enables low power consumption working mode
4	RX	UART RX. External pull-down resistor is recommended if not used.
5	TX	UART TX
6	GND	Ground
7	COMM	SPI/IIC selection. High for SPI, Low for IIC
8	ADR0/CS	Address 0 for IIC communication / chip selection for SPI

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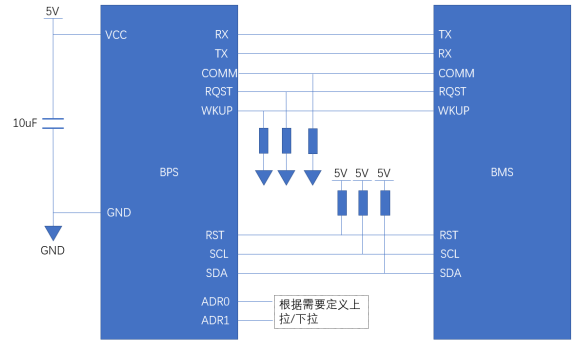
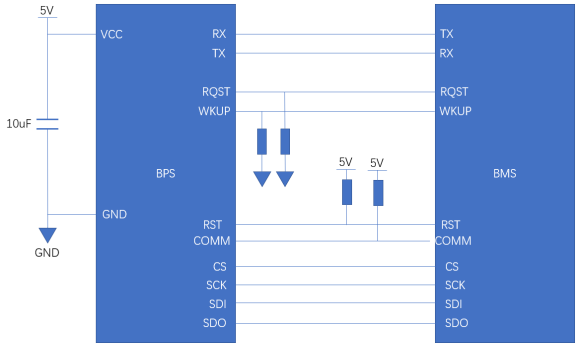
9	ADR1/SDO	Address 1 for IIC communication / SDO signal for SPI
10	SDA/SDI	SDA for IIC communication / SDI signal for SPI
11	SCL/SCK	IIC / SPI Clock signal
12	VCC	Supply Voltage

2.5 TYPICAL APPLICATION

BPS Gen 2 product minimum typical application diagrams are as below for different communication mode.

IIC Selected	SPI Selected (not available now)
	

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